

the Fucaceæ, but non-sexual sporanges containing zoospores similar to those of the *Laminariaceæ*. Mr. E. A. L. Batters describes an interesting new genus of perforating marine Algæ, *Conchocelis*, belonging to the order *Porphyraceæ*, which forms pink stains on empty shells, especially those of *Mya truncata* and *Solen vagina*. Miss Ethel S. Barton describes malformations produced in two seaweeds, *Ascophyllum nodosum* and *Desmarestia aculeata*, by the attacks respectively of a new species of Nematode, *Tylenchus fucicola*, somewhat similar to that which produces the well-known "galls" of *Vaucheria*, and of an undetermined Copepod. The editor himself has two papers, one on a fossil Alga belonging to the genus *Caulerpa*, from the Oolite (Kimmeridge clay of Dorsetshire), a new species, which he names *C. Carruthersii*; and one on the genus of marine Algæ, *Dictyosphaeria*, the position of which he retains among the *Valoniaceæ*, near to *Valonia* and *Anadyomene*. The present number is illustrated by eight well-executed plates, most of them coloured.

A. W. B.

Live Stock. By Prof. Wrightson. (London: Cassell, 1892.)

THIS is the third of Cassell's series of agricultural textbooks, and though hardly equal to other writings of Prof. Wrightson, will be found useful as a reader in elementary classes.

The illustrations are well done, and the text is pretty clear, except perhaps on pp. 52-53, in a paragraph upon the "effect of food on milk." Here it is said that

"The quantity of milk is therefore in some degree dependent on liberal feeding. The quality of the milk is much less easily controlled, and it is doubtful if any special feeding will materially alter the percentage of butter-fats or cream in milk."

Then, at the end of the paragraph we have—

"Watery foods, such as silage, grass, grains, and distillery wash, increase the quantity of milk, but lower the quality, and in town dairies, where a large amount of milk is the principal object, they are much employed."

This paragraph is contradictory and confusing, for Prof. Wrightson himself admits that the quality of milk may be lowered by using watery foods, and we are decidedly of opinion that it may be increased by means of rich, oily foods.

LETTERS TO THE EDITOR

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Lord Kelvin's Test Case on the Maxwell-Boltzmann Law.

IN his recent communication to the Royal Society, of a case disproving the Boltzmann law, Lord Kelvin seems to have overlooked an important consideration.

It is well known that in an atmosphere near the earth, under conductive (not convective) equilibrium of temperature, the mean kinetic energy (*i.e.*, the temperature) would be uniform notwithstanding the attraction of the earth, which causes each molecule to move more rapidly at the lower end of its path than at the upper end. This is due to the effect of gravity in sifting out the less rapidly moving particles, preventing them from reaching the upper layers, so that, of the particles in any one layer which reach a higher layer, the great proportion are those which move rapidly in the lower layer. Thus there will be fewer particles in the upper layer, but the mean kinetic energy of a particle will be the same in both.

Applying these considerations to Lord Kelvin's example, it appears that the C particle, when going rapidly, will penetrate a considerable distance into the region of the repulsive force, while, when going slowly, it will only penetrate a short distance. Thus the *duration* of a slow flight might be much shorter than

that of a quick one (with a force varying directly as the distance, the durations would be equal). It is quite different with the A particle, which moves uniformly to the end of the tube and back again. The duration of a slow flight will be long, and of a quick flight short, being always inversely proportional to the velocity. Again, it appears evident that the chances for C having a great or small initial velocity at B are exactly the same as those for A. Hence, if we compare the velocities of A and C at an instant arbitrarily chosen, the probability of our happening on a time when A is moving slowly may be less than that of our happening on a time when C is moving slowly, and we cannot conclude that the mean kinetic energy of A is greater than that of C; indeed, a comparison of this case with that of the atmosphere, would lead us to expect that the mean kinetic energies of A and C would be equal.

There are cases in which the Boltzmann-Maxwell distribution does not hold. For instance, the case of a large particle confined at the end of a tube, with numerous small particles bombarding it. The mean kinetic energy of the large particle will depend on the range of its motion in the tube. This example would suggest the conclusion that in such cases as gases in contact with solids and liquids, where the molecules of the latter are so confined by molecular forces as to approximate to the condition of the large particle at the end of the tube, the conditions of temperature equilibrium can hardly be determined by the Boltzmann-Maxwell law.

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EDW. P. CULVERWELL.

Poincaré's Thermodynamics.

RENTRANT à Paris après une assez longue absence, je prends seulement connaissance de la dernière lettre de M. Tait. Je ne veux pas continuer une discussion qui ne saurait se prolonger sans dégénérer en une simple logomachie. Il résulte en effet des débats que M. Tait n'attribue pas le même sens que moi à certaines expressions, et en particulier au mot force électromotrice. Il me semble seulement, puisque c'était mon livre qu'il critiquait, que c'était à lui d'adopter mon langage, qui est d'ailleurs celui de tout le monde. Je m'arrêterai donc là, quoiqu'il arrive.

Je suis pourtant obligé d'insister sur un point, parce que je ne veux pas laisser suspecter ma bonne foi. M. Tait a écrit: "Nothing is said, in this connection, about Joule's experiments." En ne tenant pas compte de ces mots "in this connection," j'aurais dénaturé sa pensée. Ces mots ne m'avaient pas échappé. Ils signifient, si je ne me trompe: "dans ses rapports avec la détermination de la température absolue." Et c'est pourquoi, après avoir rappelé que j'avais décrit ces expériences à la page 164, j'ai ajouté que j'avais expliqué à la page 169 comment elles permettent de déterminer la température absolue.

POINCARÉ.

[I need scarcely say that I never dreamt of doubting the good faith of M. Poincaré. What I did (and still do) doubt is my having made my meaning clear to him. For I cannot see how such a discussion could degenerate into a mere war of words. So far as I understand myself, I have been dealing mainly with the validity of certain modes of establishing physical laws, not with the mere terms employed in describing the experimental facts on which they are founded.—P. G. T.]

Land and Freshwater Shells Peculiar to the British Isles.

THERE cannot be any reasonable doubt that the inland Mollusca of Britain present some peculiar features, but it is surprising, considering the amount of attention that has been devoted to them, how little exact knowledge we have of this subject. This want of knowledge is doubtless due to two principal causes—first, that so many conchologists consider varieties, and especially slight varieties, to be of little or no importance; and secondly, because those who study our native shells are, as a rule, but ill acquainted with foreign species and varieties. The publication of a list of supposed peculiar forms in the new edition of Dr. Wallace's "Island Life," will, it is hoped, direct attention to this matter. Although this list is more or less provisional, and will doubtless require much alteration as time goes on, I anticipate that the number of forms actually peculiar to our islands, when fully ascertained, will considerably exceed eighty-three, the number at present listed. On the other hand, no doubt, several at present in the list will have to be eventually struck out.

With regard to the peculiar species: *Limnaea involuta* is doubtless an isolated derivative of the *peregra*-type, to which the curious and distinct var. *burnetti* of Scotland may be said to lead. *Assimineea grayana* and *Hydrobia jenkinsi* belong to the brackish-water and salt-marsh fauna, which, as has been well observed, formerly extended far beyond its present limits. To this now-restricted fauna belong many of our peculiar Lepidoptera (see the list in "Island Life," pp. 347-350), and the probability is that most of these are destined shortly to become extinct, as the large copper butterfly (*Chrysophanus dispar*) already is. The fourth species, *Geomalacus maculosus*, is not strictly peculiar, being also found in Portugal; but it is a survival of the Lusitanian fauna, to be classed with numerous plants of similar range, recorded in "Island Life," p. 364. Thus, of the four species given as peculiar, one only is strictly endemic, having regard to its whole history; and the three others are apparently best regarded as survivals of faunæ which were formerly more widely spread.

Turning now to the varieties, we meet with a much larger proportion of truly endemic forms, though from our want of knowledge there is much uncertainty. *Limax marginatus* var. *maculatus* is quite common in parts of Ireland, and as it is a very striking form, it could not easily have been overlooked had it occurred on the Continent. The same applies with perhaps greater force to the beautiful var. *albolateralis* of *Arion ater*, which abounds in parts of Wales. The black variety of *Agriolimax agrestis* is frequent in some places in Yorkshire, and has never been detected on the Continent. But Simroth found it recently on mountains in the Azores, above the zone of cultivation; and in Sicily and Crete there is a melanistic form (*panormitanus*), still more differentiated. The var. *griseus* of *A. agrestis*, found in England, and lately by Scharff in Ireland, is grey instead of black, but I am not aware that even this degree of melanism exists on the Continent, though, it is true, they have the dark brown var. *tristis*.

This melanism is well illustrated by other British slugs—namely, two forms of *Limax flavus*, and two of *Amalia soverbyi*, and may be compared with the well-known cases of melanism so frequent among our Lepidoptera. That there is a strong tendency to the formation of melanistic races in these islands cannot, I think, be doubted; and insular melanism elsewhere has been well established as a fact.

There is another class of varieties, noticed especially in the shells, characterized by a slight and yet real difference from the continental type. This sort of variation is as yet very little worked out, but most conchologists who have received common species in numbers from abroad, must have noticed how frequently they have a different *facies* from those familiar to us in Britain, though the actual difference may be so slight that we should hesitate to separate them as varieties. Quite recently, M. Bourguignat has regarded certain British specimens of *Clausilia* and *Unio* as constituting new species. Probably hardly anyone will be found to follow him in this decision, but we know how thoroughly he and his colleagues have ransacked Europe, and especially France, for novelties, so we may rest assured that in all probability these shells represent variations not existing on the Continent.

Another class consists of forms which might be set down by some as mere monstrosities, but which, nevertheless, are local in their distribution. Such are sinistral forms, which occur rarely in many species, but in many instances frequently in certain places. This form of variation is certainly inherited, and in fact has become the character of species and genera. White shells of coloured species are apt to be scoffed at as mere albinos, but the character is undoubtedly an important one, since in *Hyalinia* we have every gradation of species from those which rarely present white varieties, to those which are normally and indeed invariably white. The colourless variety of *Cochlicopa lubrica* is frequent in one or two British localities, at least, but I never heard of its occurrence on the Continent, nor in North America, where the species is abundant.

The sources of possible error, in estimating the number of peculiar forms, are obviously many, and hence the need for prolonged and careful research in the future. *Helix virgata* var. *subdeleta* is very common in England, and I formerly supposed it endemic; but recently Mr. J. T. Carrington found it at Toulon; and *Helix dautezi*, Kobelt, a supposed species from near Algiers and Gibraltar, is almost precisely identical with it, so far as I can judge from specimens collected by the Rev. J. W. Horsley. The variety *leucozona* of the same species also seemed characteristic of the British fauna, but a form from

Toulon differs but slightly from it. *Arion hortensis* var. *fallax*, with orange slime, is given as peculiar. It may, however, be the same as var. *subfuscus*, C. Pfr., which is of a brownish colour, or var. *rufescens*, which is described as reddish or orange. These would look extremely like *fallax* when the latter was covered with slime; but there is an element of uncertainty, since Dr. Scharff has shown that in *A. subfuscus*, Drap., there are two forms, one coloured reddish only by its slime, as in *fallax*, and the other with a yellow pigment in the skin. Similarly, we remain doubtful about *Helix aspersa* var. *lutescens*, a form not rare in some English localities. I know nothing described from the Continent that would agree with it, but when it loses its epidermis it agrees with the description of a French variety, and if we suppose the type of the latter to have been a weathered specimen, the two must be identical.

T. D. A. COCKERELL.

Institute of Jamaica, Kingston, Jamaica, May 3.

The Former Connection of Southern Continents.

I READ Mr. Lydekker's article on "The Discovery of Australian-like Mammals in South America," in NATURE of May 5 (p. 11), with the greatest interest. It is worth while calling attention to a physiographic fact pointing towards a former connection between South America and Southern Africa, such as appears to be required on biological grounds, as pointed out by Mr. Lydekker.

The island of South Georgia in the Antarctic Ocean lat. 54° S., long. 37° W., is composed of clay-slate, the mountains, rising precipitately from the ocean, attaining to altitudes of from 2000 to 3000 metres (NATURE, March 27, 1884, p. 509). It is about 1200 miles due east of Cape Horn, and almost exactly one-third of the way between that cape and the Cape of Good Hope.

The full significance of these facts seems hardly to have been realized, especially from a geological point of view. The existence of clay-slate rock forming mountains of an Alpine character indicates with certainty that the island is a portion of a submerged land of great extent. In "The Origin of Mountain Ranges" I have dwelt upon and developed the law that all great mountain ranges (not volcanoes) are thrown up only in areas of great sedimentation. This is true of every mountain range that has been geologically examined, and I do not know of a single exception. Keeping this law well in view, clay-slate mountains of an Alpine character protruding directly from the ocean become invested with deep meaning. They indicate vast horizontal extensions of thick sedimentary deposits which have been subjected to great lateral pressure, and have become ridged up along lines of least resistance. That such sedimentary rocks exist far and wide, forming the ocean bottom about the island of South Georgia, I have not the least doubt. A continental stepping-stone one-third of the way is a somewhat important independent support towards the land connections required by biologists between two great continents.

Park Corner, May 9.

T. MELLARD READE.

The Lesser Spotted Woodpecker.

THE lesser spotted woodpecker is rather a rare bird, and perhaps the following notes may be worth recording.

This house is in the fields, at the foot of the Cotswolds. Opposite my bedroom window, and only four yards distant, there is a very tall old Lombardy poplar, with a stem two feet thick. One of these birds visited this tree almost every day from the latter part of March till the 12th of this month, coming every morning between 6 and 8, and sometimes also at other hours. He fixed himself always on the same part of the stem, opposite my window, and about 25 feet from the ground; and as there are only a few small branches there, he was very plainly seen. He made a remarkable sound, very loud, like the boring of a large auger, continued for one or two seconds, and repeated again and again at short intervals. While the sound continued his whole body seemed in rapid vibration, and he was tapping the tree with extreme rapidity with the point of his beak. During the intervals his head was generally moving quickly from side to side, and his beak was often turned over to plume himself. At this time the crest on his head became often a splendid object. When the sun shone on it, it was like a flash of flame, or the glitter of polished copper foil. The bird was about six inches long, with a rather thick, fluffy-looking body, the tail and back striped black and white, the stripes broadest at the tail. What he was really doing I could not determine. The